Center for Information Technology

Biowulf’s Benefits Showcased in Two Recent 'I Am Intramural' Blogs

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Biowulf, part of CIT’s High-Performance Computing Services and the main computational resource for the National Institutes of Health, supports the work of investigators within NIH's Intramural Research Program (IRP) by facilitating large-scale data analyses, research that has made IRP a world leader in biomedical computing and in protecting and improving health.

IRP's I Am Intramural blog recently highlighted how one IRP researcher used Biowulf to create mathematical models that represent the biological systems involved in weight loss and communication between brain cells, and how another team of investigators used the supercomputer to determine how gene expression affects the risk for cardiovascular diseases.

The first of the studies was led by Carson Chow, Ph.D., a Laboratory of Biological Modeling Section Chief at the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). Biowulf helped him create a model that mimics patterns of healthy neuron activity in the real world. One application of this kind of modeling, Dr. Chow says, could allow researchers to “break” such models “to make them behave the way collections of brain cells do in patients with mental illnesses like autism.”

Also using Biowulf is Daniel Levy, M.D., Branch Chief for the National Heart, Lung, and Blood Institute’s (NHLBI) Population Sciences Branch. Dr. Levy’s lab is performing genome-wide association studies (GWAS) with data from NHLBI’s 70-year-old Framingham Study. Biowulf allowed the research team to do millions of computations to better understand how genetic variation can affect the expression of different genes.

Dr. Roby Joehanes, a staff scientist in Dr. Levy’s lab, says, “[W]e had about eight million genetic variants and about 285,000 fragments of gene expression. I took just a tiny piece of our data and tried to gauge how long it would take to accomplish this computation, and I initially came up with an estimated time of about 3,000 years. Those 3,000 years of computations shrunk to about nine days using Biowulf.”

You can follow more IRP discoveries and stories on the I Am Intramural Blog.